

3D Simulation of Vibrating Diamond Grinding

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A method of 3D simulation of vibrating diamond-abrasive machining based on a finite element model of the process is worked out. Calculation of the deflected mode of grinding area is the evidence that high-frequency vibration has a considerable effect on the amount of fractured material. Equivalent stress in the grinding zone increases up to 1.5-2.0 times. By means of FEM simulation of ultrasonically assisted grinding it is found that when grinding without imposing high frequency vibrations the maximum load is concentrated on a certain face of diamond grain. This can lead to the fracture of a grain in contact area with a bond and subsequent untimely shedding of the grain from the bond. However, uniform distribution of the stresses along the grain when imposing high-frequency vibrations improves retention of the grain in bond.

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